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73 Proprietor: NATIONAL RESEARCH  
DEVELOPMENT CORPORATION  
101 Newington Causeway  
London SE1 6BU (GB)

72 Inventor: Stevens, Anthony  
Prospect House 58 Leam Terrace  
Leamington Spa Warwickshire CV31 1BQ (GB)

74 Representative: Stables, Patrick Antony  
Patent Department National Research  
Development Corporation 101 Newington  
Causeway  
London SE1 6BU (GB)

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## Description

This invention relates to windscreen wiper arms for automobile vehicles, that is to say to the arms that connect the wiper blades to the driving mechanism by which they are rotated to and fro.

To be commercially acceptable, a wiper arm must fulfil two requirements amongst others. Firstly it must be so designed that the blade is pressed firmly against the windscreen in use, and so that the arm itself is securely attached to the driving mechanism. Secondly it must be simple when the arm is not in use to move it to a second position in which the blade is well clear of the windscreen and can therefore easily be cleaned. The need to achieve these and other requirements reliably has led to the conventional windscreen wiper arm being a quite complex item, having many individual parts. To achieve both the firm blade/windscreen contact in use and the second cleaning position it has become customary to include two spring mechanisms, one provided by the material of the arm itself and the other by a separate coil spring. The presence of the coil spring has in turn required a channel-shaped structural item, which would otherwise be unnecessary, to mask and protect it. Patent specification FR-A-1468811 is one of many prior publications describing a windscreen wiper arm having means to connect it to rotary driving mechanism at one end, means for carrying a wiper blade at the other end, and between those two ends a region containing a hinge and also a coil spring and a protecting channel-shaped structure as just described.

It should also be noted that attachment of known types of arm to the customary splined cylindrical driving spigot has been by way of a rigid and matching splined socket mounted at one end of the arm and the paramount need for ensuring reliable engagement between the spigot and the socket in use has caused most arms to include, as yet a further component part, a spring-loaded catch that engages under the head of the spigot and that has to be deliberately drawn back if the arm and spigot are to be separated.

The present invention arises from the search for a simpler yet still reliable design, and results in particular from appreciating the possibility of a variable-geometry but unitary structure. By unitary I mean a structure without discontinuity, and without joints of the kind where flexure is intended.

The invention is a flexible windscreen wiper arm of the type shown for instance in FR-A-1468811, that is to say of unitary construction and adapted for connection to and oscillatory rotation by rotary driving mechanism, in which there are means at one end of the arm for connection to the driving mechanism, and means towards the other end of the arm for connecting it to a windscreen wiper blade, characterised in that the arm is of unitary construction, and between the two connecting means the unitary arm includes a region capable of over-centering action, whereby the

arm has two stable configurations lying one to either side of the centre position and is adapted when in one of those configurations to act as a spring to urge the wiper blade into contact with a windscreen. The over-centering region may have dished configurations, of opposite curvatures, in the two stable positions.

The arm may be formed with an aperture which corresponds with the middle of the over-centering region.

The means of connection to the driving mechanism may comprise a generally-cylindrical and variable-geometry socket associated with the over-centering region of the arm, whereby in one stable position of that region the section of the socket is reduced so as to grip the mechanism and in the other stable position of the arm the socket section is expanded so as to release the mechanism. That socket may be of "C"-shape when viewed in radial section relative to the axis of the oscillatory rotation, and the mouth of the "C" may face towards the opposite end of the arm.

The invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 shows a windscreen wiper arm in lengthwise section, the plane of the section including the axis of its driving spindle;

Figure 2 is an underneath plan view taken in the direction of the arrow II in Figure 1;

Figure 3 is a section on the line III-III in Figure 1, and

Figure 4 is an underneath perspective view of such an arm.

The arm 1 is a unitary structure and can advantageously be moulded, cast, pressed or otherwise formed as a one-piece unit from any material of suitable strength and resilience; the arm actually shown in Figure 4 may for instance be formed by moulding a thermosetting epoxy or polyester resin, filled with glass fibres, between dies. At one end of the arm a lug 2 formed with a hole 3 provides in this example the means of connection to a windscreen wiper blade 4 operating on a windscreen 5, the latter two parts being indicated in outline only in Figure 1. At the other end of the arm a socket 6, formed with internal splines 7, provides in this example the means of connection to oscillatory rotary driving mechanism in the form of a cylindrical driving spindle 8 formed with corresponding external splines 9, as shown in outline in Figure 1. The engagement between splines 7 and 9 prevents mutual rotation between socket 6 and spindle 8 when they are thus connected. Between lug 2 and socket 6 the arm comprises a substantial length 11 of rectangular section, the area of which section increases gradually with distance from the lug, and a region 12 adjacent the socket 6 where the arm splits into two limbs 13 and 14 separated by a central aperture 15. As seen in Figure 4 and at 13a and 14a in Figure 3, the surfaces of limbs 13 and 14 are inclined to the line 16 so that region 12 of the arm has a dished shape about line 16, with the mouth

— i.e. the concave face — of the dish opening downwardly, that is to say in the same direction as the mouth of socket 6. The combination of this dished shape and the resilient material holds the arm in the stable configuration shown in full lines in Figure 1, with the lug 2 at the tip of the arm resiliently biased downwardly relative to socket 6. This is the position which the arm should adopt in use, so that region 12 and length 11 together act as a spring to press the wiper blade 4 into firm contact with the windscreen 5. If however the tip of the arm is bent upwards, against the resistance offered by region 12, a condition (indicated by broken line 17, Figure 1) will be reached where an over-centering action operates and the dished configuration of region 12 reverses, so that the surfaces of limbs 13 and 14 become angled to line 16 as shown at 13b and 14b in Figure 3, and the mouth of the dished configuration of region 12 now points in the opposite direction to the mouth of socket 6. Arm 1 is therefore biased to the upper position shown at 18 in Figure 1, in which the lug 2 at the tip of the arm will be well separated from the windscreen 5 and will therefore expose the blade 4 for cleaning.

According to a further feature of the invention the socket 6 is not a complete cylinder but is "C"-shaped as seen in Figures 2 and 4, with the mouth 19 of the "C" facing down the length of the arm 1. It will be readily apparent from the geometry of the adjacent region 12 of the arm, as seen particularly in Figures 3 and 4, that when limbs 13 and 14 are angled as at 13a and 14a, the extremities 20 and 21 of the "C"-shape of socket 6 are angled as at 20a and 21a in Figure 3, and therefore tend to grip spindle 8 and so secure the arm on the spindle when in use. However when the arm is moved to position 18 and limbs 13 and 14 take up positions 13b and 14b, extremities 20 and 21 take up positions 20b and 21b as shown in Figure 3, so releasing the grip of socket 6 upon spindle 8 and allowing the entire arm to be removed from the spindle to facilitate the cleaning of the blade 4. To return the blade to its working position and simultaneously engage the arm with spindle 8, it is only necessary to fit socket 6 over spindle 8, taking care to align the arm 1 with the desired position on its sweep of action, and then while holding the socket in position over the spindle to press the arm 1 downwards until limbs 13 and 14 both over-centre back to their original positions 13a and 14a, in which socket 6 positively grips the spindle 8 and the blade 4 is spring-loaded against the windscreen 5.

#### Claims

1. A flexible windscreen wiper arm (1) adapted for connection to and oscillatory rotation by rotary driving mechanism (8), in which there are means (6, 7) at one end of the arm for connection to the driving mechanism, and means (2, 3) towards the other end of the arm for connecting it to a windscreen wiper blade (4), characterised in that the arm is of unitary construction, and in that

between the two connecting means the unitary arm includes a region (12) capable of over-centering action, whereby the arm has two stable configurations lying one to either side of the centre position and is adapted when in one of those configurations to act as a spring to urge the wiper blade into contact with a windscreen.

2. A windscreen wiper arm according to Claim 1 characterised in that the over-centering region has dished configurations (13a, 14a; 13b 14b), of opposite curvatures, in the two stable configurations.

3. A windscreen wiper arm according to Claim 3 characterised in that the arm is formed with an aperture (15) which corresponds with the middle of the over-centering region.

4. A windscreen wiper arm according to Claim 1 characterised in that the means for connection to the driving mechanism comprises a generally-cylindrical and variable-geometry socket (6) associated with the over-centering region of the arm, whereby in one stable position (as at 13a, 14a) of that region the section of the socket is reduced so as to grip the mechanism (8), and in the other stable position of the said region (as at 13b, 14b) the socket section is expanded so as to release the mechanism.

5. A windscreen wiper arm according to Claim 4 characterised in that the socket is of "C"-shape when viewed along the axis of the oscillatory rotation.

6. A windscreen wiper arm according to Claim 5 characterised in that the mouth (19) of the "C" faces towards the opposite end (2, 3) of the arm.

#### Patentansprüche

1. Zum Anbringen an und Hin- und Herdrehen durch einen Drehantriebsmechanismus (8) ausgebildeter flexibler Scheibenwischerarm (1), bei welchem an einem Ende des Armes eine Einrichtung (6, 7) zum Anbringen an den Antriebsmechanismus und in Richtung zum anderen Ende des Armes eine Einrichtung (2, 4) zu dessen Anbringen an ein Scheibenwischerblatt (4) vorgesehen sind, dadurch gekennzeichnet, daß der Arm von einheitlichem Aufbau ist, und daß der einheitliche Arm zwischen den zwei Anschlußeinrichtungen einen zu einer Schnappfunktion über eine Mittelstellung geeigneten Bereich (12) aufweist, wobei der Arm zwei stabile Konfigurationen, von denen auf jeder Seite der Mittelstellung eine liegt, aufweist und so ausgebildet ist, daß er, wenn er in einer dieser Konfigurationen ist, als Feder zum Andrücken des Wischerblattes an eine Scheibe wirkt.

2. Scheibenwischerarm nach Anspruch 1, dadurch gekennzeichnet, daß der zur Schnappfunktion über die Mittelstellung geeignete Bereich in den zwei stabilen Konfigurationen gewölbte Konfigurationen (13a, 14a; 13b, 14b) entgegengesetzter Wölbungen aufweist.

3. Scheibenwischerarm nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Arm mit einer Öffnung (15) gebildet ist, welche mit der Mitte des

zur Schnappfunktion über die Mittelstellung geeigneten Bereichs korrespondiert.

4. Scheibenwischerarm nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Einrichtung zum Anbringen an den Antriebsmechanismus eine mit dem zur Schnappfunktion über die Mittelstellung geeigneten Bereich des Armes verbundene, generell zylindrische Basis (6) variierbarer Geometrie aufweist, wobei in einer stabilen Stellung (wie bei 13a, 14a) dieses Bereiches der Basisabschnitt so reduziert ist, daß er den Mechanismus (8) erfaßt, und in der anderen stabilen Stellung des Bereiches (wie bei 13b, 14b) der Basisabschnitt so erweitert ist, daß er den Mechanismus freigibt.

5. Scheibenwischerarm nach Anspruch 4, dadurch gekennzeichnet, daß die Basis längs der Achse der Hin- und Herdrehung gesehen "C"-förmig ist.

6. Scheibenwischerarm nach Anspruch 5, dadurch gekennzeichnet, daß der Mund (19) des "C" dem entgegengesetzten Ende (2, 3) des Armes zugekehrt ist.

#### Revendications

1. Bras d'essuie-glace flexible (1) adapté pour être raccordé à un mécanisme d'entraînement rotatif (8) et pour être entraîné d'un mouvement de va-et-vient par ce mécanisme, ce bras ayant des moyens (6, 7) à une extrémité pour être raccordé au mécanisme d'entraînement et des moyens (2, 3) vers l'autre extrémité pour raccorder le bras à un balai d'essuie-glace (4), caractérisé en ce que le bras a une structure unitaire et en ce que, entre les deux moyens de raccordement, le bras unitaire comporte une région (12) suscep-

tible de passer brusquement un point mort, d'où il résulte que le bras a deux configurations stables disposées respectivement de part et d'autre de la position centrale et qu'il est adapté, quand il se trouve dans l'une de ces configurations, pour agir en tant que ressort pour appliquer le balai d'essuie-glace en contact avec le pare-brise.

2. Bras d'essuie-glace selon la revendication 1, caractérisé en ce que la région de passage brusque de point mort a des configurations incurvées (13a, 14a; 13b, 14b), de courbures opposées, dans les deux configurations stables.

3. Bras d'essuie-glace selon la revendication 2, caractérisé en ce que le bras est formé avec une ouverture (15), qui correspond au milieu de la région de passage brusque de point mort.

4. Bras d'essuie-glace selon la revendication 1, caractérisé en ce que les moyens pour raccorder le mécanisme d'entraînement comportent une douille (6) de forme générale cylindrique et à géométrie variable, associée à la région de passage brusque de point mort du bras, d'où il résulte que, dans une position stable (comme en 13a, 14a) de cette région, la section de la douille est réduite de façon à saisir le mécanisme (8) et, dans l'autre position stable de la région, (par exemple 13b, 14b), la section de la douille est agrandie de façon à libérer le mécanisme.

5. Bras d'essuie-glace selon la revendication 4, caractérisé en ce que la douille a la forme d'un "C" lorsqu'elle est considérée le long de l'axe de la rotation oscillante.

6. Bras d'essuie-glace selon la revendication 5, caractérisé en ce que l'embouchure (19) du "C" est orientée en direction de l'extrémité opposée (2, 3) du bras.

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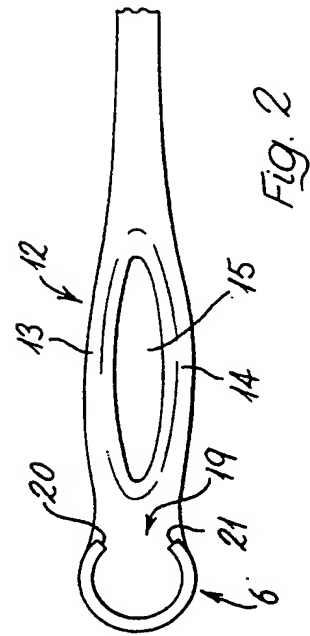
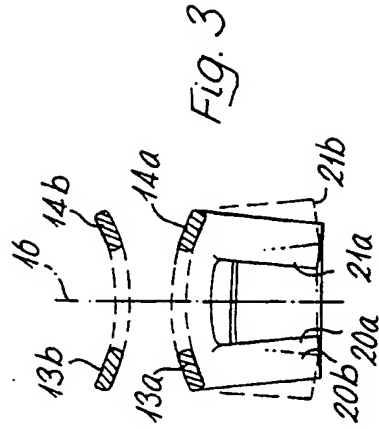
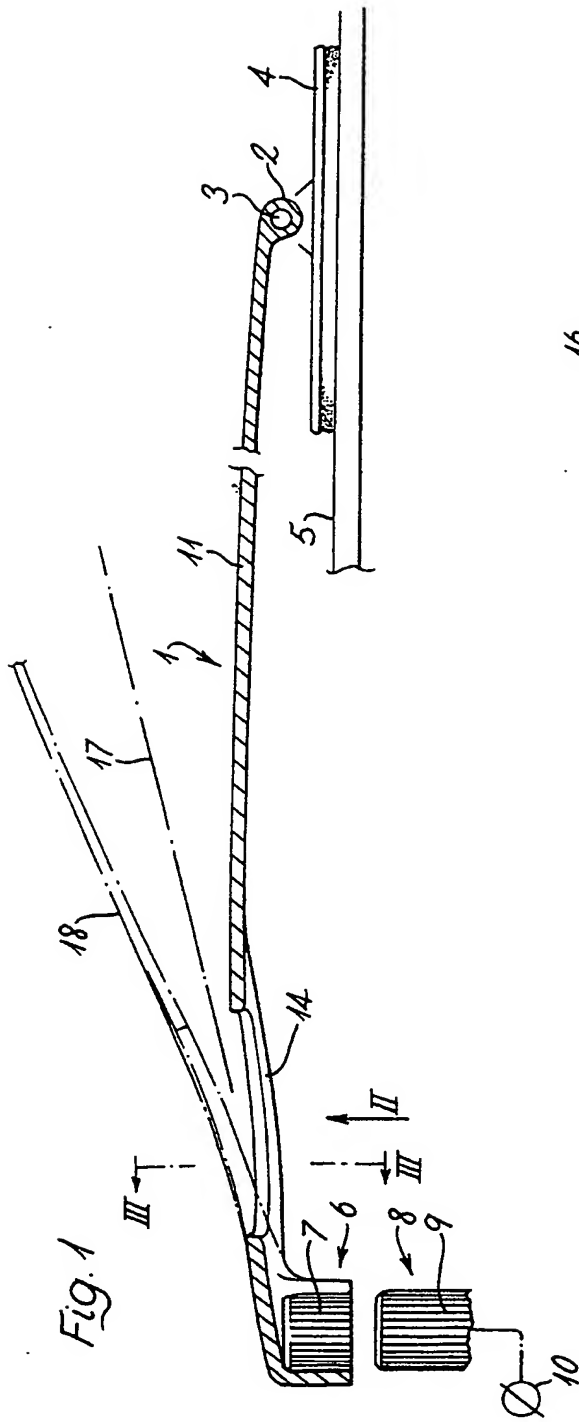
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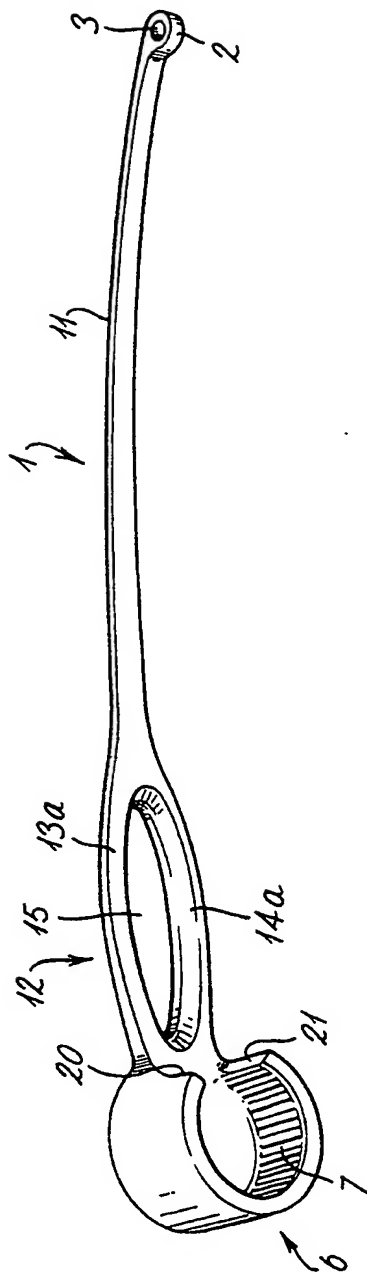


Fig. 4